CLAIMS

1. A magnetic powder composed primarily of Fe that has been surface-treated with a silane coupling agent, which magnetic powder is characterized in that:

it contains

Co such that Co/Fe expressed in atomic percent is 20 – 50 at.%,

Al such that Al/Fe expressed in atomic percent is 5 – 30 at.%, and

one or more rare earth elements R (including Y) such that R/Fe expressed in atomic percent is 4 – 20 at.%,

and has

average particle diameter of smaller than 80 nm,

TAP density of 0.7 g/cm^3 or greater,

ignition point of 165 °C or higher, and

oxygen content of 26 wt% or less.

2. A magnetic powder composed primarily of Fe, which is a magnetic powder for a coating-type magnetic recording medium that:

has

a particle volume (V) calculated from a transmission electron micrograph of not less than 1000 nm^3 and not greater than 15000 nm^3,

contains

Si such that Si/Fe expressed in atomic percent is 0.1 – 10 at.%, and

C such that C/Fe expressed in atomic percent is 0.5 – 40 at.%,

and has

oxygen content of 26 wt% or less

TAP density of 0.7 g/cm^3 or greater,

ignition point of 165 °C or higher,

$\Delta\sigma s$ (amount of change (%) in saturation magnetization value σs during storage for

seven days under constant temperature and humidity at a temperature of 60 °C and relative humidity of 90%) of 20% or less, and

saturation magnetization value σs of less than 140 emu/g,

and satisfies

the relation of Formula 1 below between its coercive force and particle volume:

Formula 1 : $Hc \geq 325 \times \ln(V) - 900$,

where, in Formula 1, Hc represents coercive force (Oe) and V represents particle volume (nm^3) calculated from a transmission electron micrograph.

3. A magnetic powder according to claim 2, which satisfies the relationship of Formula 2 between its $\Delta\sigma$ and particle volume (V) and satisfies the relationship of Formula 3 between its oxygen content and particle volume (V):

Formula 2 : $\Delta\sigma s \leq -7.8 \times \ln(V) + 94$,

Formula 3: Oxygen content $\leq -4.2 \times \ln(V) + 55$.

4. A magnetic powder according to claim 2 or 3, which is composed of acicular iron alloy magnetic particles whose:

specific surface area by BET method is 60 m^2/g or greater,

average major axis length is 20 – 80 nm,

Co content is such that Co/Fe expressed in atomic percent is 20 – 50 at.%,

Al content is such that Al/Fe expressed in atomic percent is 5 – 30 at.%, and

rare earth element R content including Y is such that R/Fe expressed in atomic percent is 4 – 20 at.%.

5. A magnetic powder according to any of claims 1 to 4, wherein the shape of the particles is flat acicular.

6. A magnetic powder according to any of claims 1 to 5, whose magnetic powder sedimentation rate is 1 cm / 5 hr or less when 3 g of the powder is dispersed in 500 mL of toluene and left to stand.

7. A magnetic powder according to any of claims 1 to 6, whose vinyl chloride

(MR-110) adsorption amount is 0.6 mg/m^2 or greater and whose urethane (UR-8200) adsorption amount is 1.1 mg/m^2 or greater.

8. A magnetic powder according to any of claims 1 to 7, whose tape ΔBm (amount of change (%) in Bm during storage for seven days under constant temperature and humidity at a temperature of 60 °C and relative humidity of 90%) is 15% or less as per a test method for evaluating tape properties.

9. A magnetic powder according to claim 8, which satisfies the relationship of Formula 4 between ΔBm and particle volume (V) of the magnetic powder:

Formula 4 : $\Delta Bm \leq -3.6 \times \ln (V) + 40.5$.

10. A magnetic powder according to any of claims 1 to 9, which, as per a test method for evaluating tape properties, satisfies:

the relationship of Formula 5 between tape Hcx and particle volume (V) of the magnetic powder,

the relationship of Formula 6 between tape SFDx and particle volume (V) of the magnetic powder, and

the relationship of Formula 7 between tape SQx and particle volume (V) of the magnetic powder:

Formula 5 : $Hcx \geq 630 \times \ln (V) - 3400$

Formula 6: $SFDx \leq 0.2 + 506\ V^{-0.79}$

Formula 7 : $SQx \geq 0.065 \ln(V) + 0.15$.

11. A method of surface treating a magnetic powder characterized in that, in surface treating particle surfaces of a magnetic powder composed primarily of iron with a silane coupling agent, the magnetic powder and the silane coupling agent are reacted in an organic medium under a nonoxidizing atmosphere and in a state of dispersion up to where the degree of dispersion β according to the formula below becomes 10 or less:

Degree of dispersion β = Dfloc (particle average volume in solvent by dynamic light scattering) / DTEM (particle average volume observed by a transmission electron

microscope).

12. A surface treating method according to claim 11, wherein the magnetic powder is composed of particles on whose surfaces is distributed hydrophilic alumina or oxide of rare earth element(s) including Y.

13. A coating-type magnetic recording medium having a magnetic layer obtained by dispersing the magnetic powder of any of claims 1 to 7 in a resin at an orientation ratio of 2.5 or greater.

14. A coating-type magnetic recording medium according to claim 13, whose magnetic layer exhibits ΔBm (amount of change (%) in Bm during storage for seven days under constant temperature and humidity at a temperature of 60 °C and relative humidity of 90%) of 15% or less

15. A coating magnetic recording medium according to claim 13, which satisfies the relationship of Formula 4 between ΔBm and particle volume (V) of the magnetic powder:

Formula 4 : $\Delta Bm \leq -3.6 \times \ln(V) + 40.5$.

16. A coating magnetic recording medium according to claim 13, which satisfies:

the relationship of Formula 5 between tape Hcx and particle volume (V) of the magnetic layer,

the relationship of Formula 6 between tape SFDx and particle volume (V) of the magnetic layer , and

the relationship of Formula 7 between tape SQx and particle volume (V) of the magnetic layer:

Formula 5 : $Hcx \geq 630 \times \ln(V) - 3400$

Formula 6: $SFDx \leq 0.2 + 506 \times V^{-0.79}$

Formula 7 : $SQx \geq 0.065 \times \ln(V) + 0.15$.